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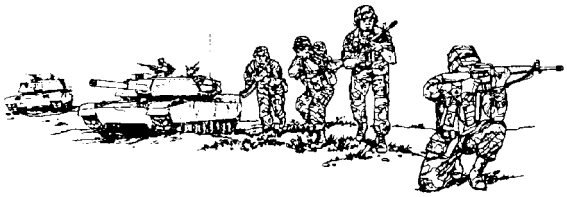

MAR-APR 95

IN THIS ISSUE!

Aviation Restructure Initiative (ARI) .....

Ramp TV - V Corps Tactical Video Teleconferencing .....

Vehicle Mine Survivability .....

A Reminder!

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AVIATION RESTRUCTURE INITIATIVE (ARI)

by LTC Douglas R. Eller and Staff, 11th Aviation Regiment, Illesheim, GE

ARI conversion is just around the corner for virtually every aviation unit in the U. S. Army. United States Army, Europe (USAREUR), and V Corps began ARI implementation in 1994. Recently, the 11th Aviation Regiment became the first AH-64 Brigade/Regiment to complete the ARI transition. With this action complete, it is now time to share our notes and thoughts with you.

This article will provide the plan or framework in which the 11th Aviation Regiment executed ARI, and the lessons we learned in the process. It is not our intent to debate the merits of ARI.

ARI was a mission assigned to the Regiment, and we have executed that mission. Additionally, we do not regard our methodology as the "best" or the "only" way, but merely one method.

Background (Figure 1). The 11th Aviation Regiment is a major subordinate command assigned to V Corps in USAREUR. During the late summer of 1993, the Regiment was notified that it would transition its subordinate attack Squadrons to the ARI MTO&E in the summer/fall of 1994. The timelines provided to us required the 11th to transition 6-6 Cavalry commencing May 1994 and 2-6 Cavalry commencing August 1994. In addition to this ARI transition, 4-229 AAHR was directed to execute a Conventional Forces, Europe (CFE)-required drawdown commencing January 1994.

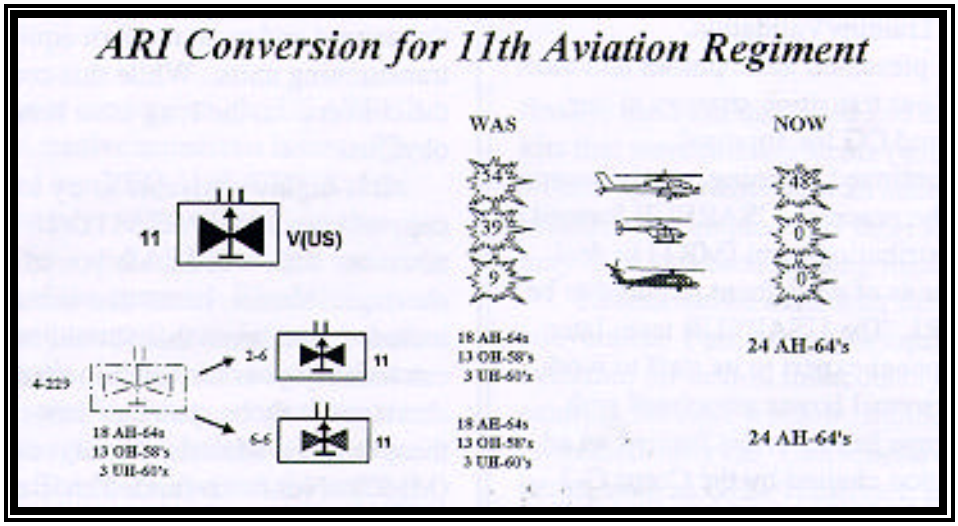

Figure 1: ARI Conversion Background

Planning. With this broad planning guidance in hand, the Regimental Commander and staff set about gathering information. We rapidly determined that there was no "how to" transition documentation available to assist us. We established our written transition plan around the following phases:

Phase 1 -- ***Cross Level.*** We opted to internally "jump-start" ARI earlier than programmed by cross-leveling personnel and equipment from our drawdown unit (4-229) to our transitioning units (2-6 and 6-6).

Phase 2 -- ***Preparation.*** Immediately following this cross-leveling phase, we decided to "shed" non-ARI personnel and equipment in an attempt to reduce turmoil and distraction during the trainup phases. Additionally, units would execute individual training during this phase.

Phase 3 -- ***6-6 Trainup/Validation.*** We entered the formal six-month ARI execution window with units that were able to primarily focus on collective training. We composed a comprehensive, progressive six-month training program that culminated with an external evaluation (ARTEP).

Phase 4 -- ***2-6 Trainup/Validation.*** Same as 6-6 Trainup/Validation.

We then presented these phases and other highlights of our transition strategy to our Corps DCG and CG for approval.

As we continued planning, others became involved in the process. USAREUR formed a material redistribution team (MRT) to deal with the mounds of equipment required to be moved by ARI. The USAREUR team later added a personnel expert to its staff to work the many personnel issues associated with ARI. The Corps headquarters formed an ad-hoc organization chaired by the Corps G-3 (Avn). Transitioning units and the Corps staff met monthly to solve ARI issues. The Corps DCG provided command oversight and assistance.

The following sections outline our plan and relate our experiences with the Logistical, Personnel and Training subsets of ARI.

LOGISTICS

From the logistical perspective, the ARI conversion process was greatly facilitated by one of three battalion-sized elements being designated as a drawdown unit at approximately the same time the other two units went through the conversion process. Early on, we moved a significant amount of equipment and resources to the transitioning units via lateral transfers. This minimized turmoil and ensured the two transitioning units a level of fill sufficient to maintain a high equipment on hand (EOH) rating. A key point here is that the Squadrons could report using the ARI MTO&E as soon as the unit commander decided the unit more closely resembled the new MTO&E, and the switchover did not degrade overall readiness. Finally, the drawdown allowed us to transfer the newest and most modern equipment to the transitioning units. While this complicated the conversion, the long term benefits are obvious.

It is highly advisable to try to obtain a copy of your unit's ARI MTO&E well in advance. This will enable you to determine shortages, excess, items that should have been included, and items that should not. If you can identify your nonforce modernization shortages early on, you can then start working these with the Material Management Center (MMC). Nonstock-funded shortages can be ordered immediately, provided the REQ-VAL data base has been modified to reflect the ARI MTO&E. Stock-funded shortages need to be ordered as soon as the budget allows.

It will astound most commanders to learn that over 1,000 pieces of equipment must be moved or change hands for an Apache battalion to convert. This is because 65 percent of the Line Item Numbers (LINs) on the MTO&E are affected by the conversion in one way or another. During our conversion, one important lesson we learned early was to phase our OH/UH PLL turn-in. Initially, we turned it in together. This was easier, but not smarter. As a result of this bulk turn-in, we exceeded a 5-percent zero balance (ZB) rate. Figure 2 illustrates this mistake, and how to avoid it.

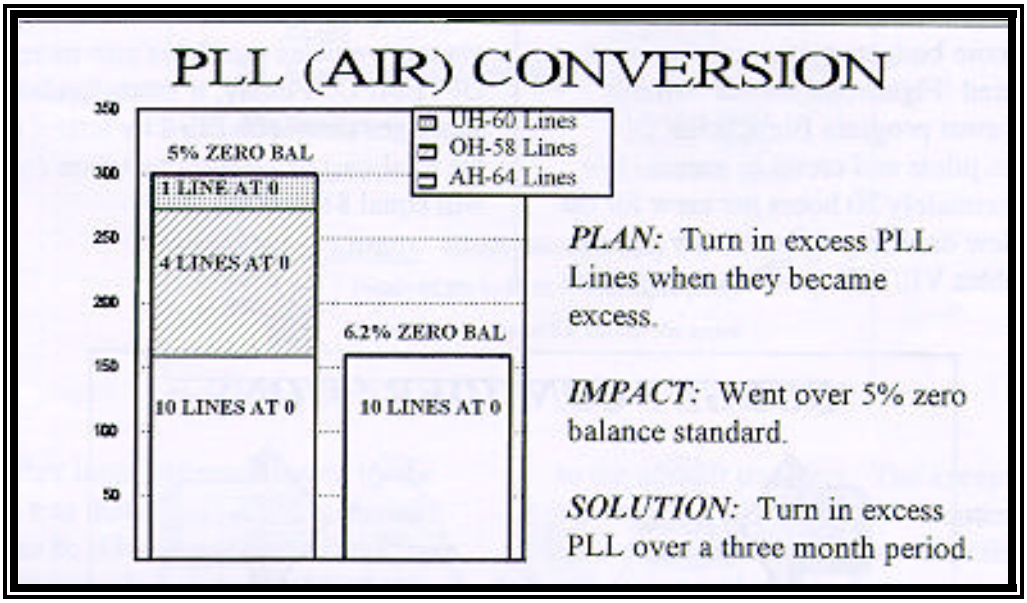

Figure 2: PLL (AIR) Conversion

During our conversion, the USAREUR MRT helped resolve numerous issues. The MRT ensured our REQ-VAL/CBS-X data bases reflected the ARI MTO&E, so that our requisitions for valid ARI shortages were not "thrown out of the system." The MRT assisted us with aircraft transfers, to include transfer waivers. It helped to locate a home for aviation specific excess, since there was not always an established claimant readily identifiable. The MRT assisted the unit by tracking ARI shortage requisitions. And finally, the team inspected and inventoried kits that were missing items (which often wound up at DRMO), in an attempt to redistribute equipment in short supply that may have just been missing minor parts.

Excess can be a monster during the conversion. Pure excess, or equipment available for turn-in immediately upon entering the ARI window, should be processed early on. Conversion excess, or items, such as OH/UH aircraft, may need to be phased out in conjunction with associated personnel. There may be excess which units wish to retain. This should be processed via request for TO&E change (DA Form 2028), MTO&E change (DA Form 4610-R) or through a request for command retention. ARI makes collection of excess very easy. Commanders must carefully weigh requests to retain excess against your ability to maintain the excess, budget considerations, and warfighting need.

Although ARI conversion is "low cost," there are some budgetary impacts that need to be considered (Figure 3). On the training side, units must program flight hours to convert gun pilots and crews to scouts. We used approximately 30 hours per crew for the trainup. New or changed crews may dictate gunnery tables VII/VIII qualifications sooner than planned. This required additional flying hours and ammunition. FTXs and STXs for the trainup were not an issue with us because they were already programmed into the budget. Our experience indicates that the cost per battalion ARTEP is approximately $470,000. Units may incur TDY costs for schooling if there are personnel shortages that cannot/will not be filled. On the logistics side, aircraft that do not meet transfer criteria can be a resource drain. Transferring excess via unit vehicles translates into increased OPTEMPO. Finally, if stock-funded shortages cannot be filled by lateral transfers, the total cost per AH-64 battalion for these will equal $158,000.

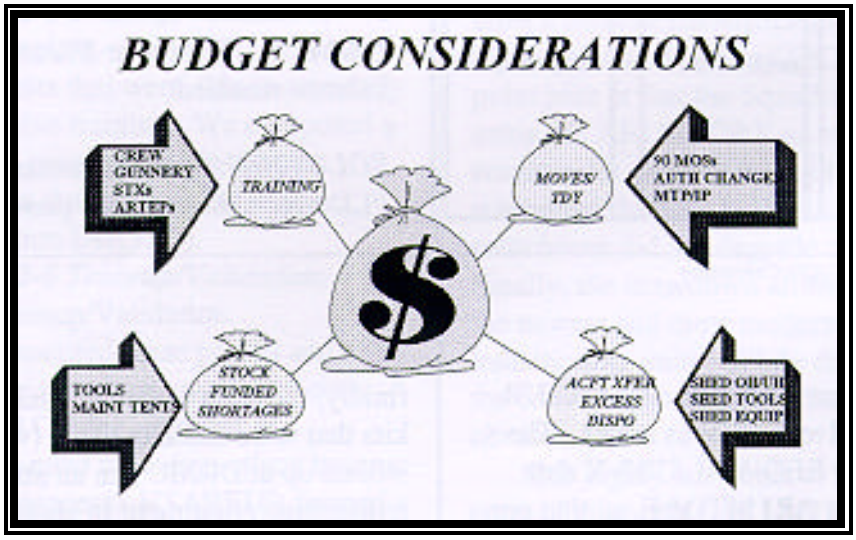

Figure 3: ARI Budget Considerations

PERSONNEL

Personnel issues associated with ARI generally fell into two categories: reassigning personnel not required by the ARI MTO&E, and filling the holes created by the MTO&E conversion. As with logistics, an MTO&E scrub done early on will yield significant insight to potential future problem areas for your particular unit.

The most striking or dramatic personnel increase due to the new MTO&E was the increase in 68X (AH-64 Armament Repairer) and 93P (Aviation Operations Specialist). We started reporting these large fill requirements on our Unit Status Report (USR) well prior to entering the six-month window. Even with drawdown personnel and Foreign Service Tour Extensions (FSTEs) included, we did not reach a high fill until almost the end of the conversion cycle for both units (Figure 4).

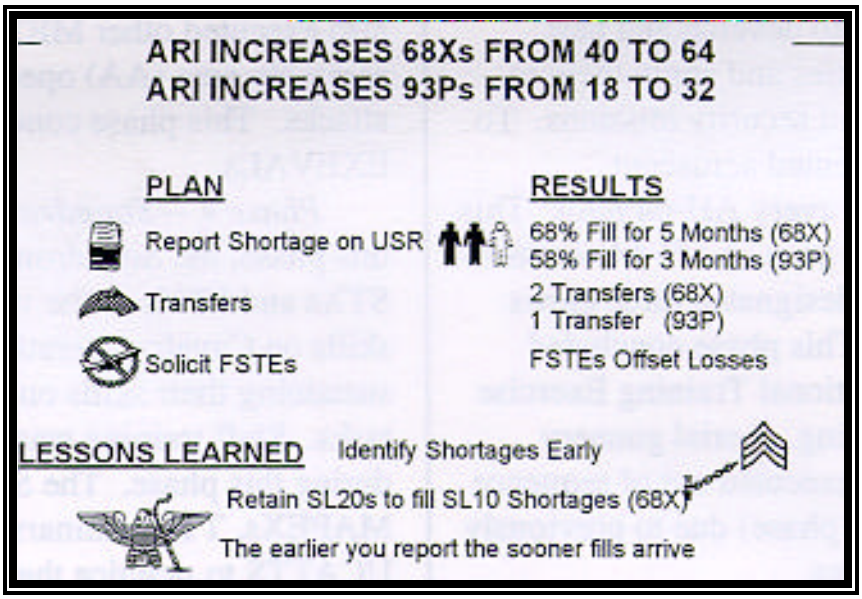

Figure 4: 68Xs / 93Ps

Another large increase created by the MTO&E was that almost all officers were required to be AH-64 qualified. There were simply not enough Apache-qualified officers available in theater, or enough school slots available to fill our requirements, no matter how early we reported these projected needs. The Regiment was driven to retain 19 non-AH-64-qualified lieutenants and captains to fill a variety of positions across the Regiment, including Troop command.

ARI displaced 83 OH-58 and 31 UH-60 personnel within the Regiment. The guidance we received instructed us to curtail those personnel with less than one year at E-date. Those with more than one year retainability kept their original DEROS and received an intertheater transfer (ITT). We linked the departure of the OH-58 and UH-60 personnel to the aircraft transfers. The exception to this rule was the OH-58/UH-60 Lieutenants and Captains mentioned above. One final issue associated with displacing personnel from transitioning units is the concerns which OH-58 personnel have about their futures. We approached this by mentoring and counseling those concerned on a case-by-case basis.

TRAINING

Armed with a draft ATM and MTP manual, we analyzed how and what we needed to train to emerge successfully at the conclusion of our transition window. We then developed a progressive, five-phase training program that culminated with out-of-country external evaluations (EXEVALs) for each unit.

Phase 1 -- ***Scout Training.*** We began our training program by changing a few mindsets. We knew that the AH-64 systems (optical, weapons, video) would make it a more capable aeroscout than the OH-58A/C. We had to learn how to develop and best exploit these capabilities and apply them to the reconnaissance and security missions. To start this, we implemented aeroscout academic training for every AH-64 pilot. This enabled us to create a pool of AH-64 scouts to draw from. We then designated three crews per troop as scouts. This phase concluded with crew-level Situational Training Exercise (STX) lane-type training. Aerial gunnery tables VII/VIII were executed out of sequence (during the collective phase) due to previously locked in gunnery dates.

Phase 2 -- ***Team Training.*** This training phase was conducted utilizing the same STX lanes as phase one. However now, multiple aircraft were organized into teams. Much emphasis was placed on premission planning. This premission planning also doubled as a review to academic training. The Squadrons organized their portion of the local helicopter training area into multiple STX lanes, so that several teams could execute simultaneously. The teams learned to fire and maneuver together, using the wing-man concept. They also learned how far they could operate apart, yet still provide security. OH-58s (still in the units) flew to the rear of the teams as observer/controllers.

Phase 3 -- ***Troop Training.*** The reconnaissance and security missions we selected as METL subtasks for our Troops were screen, route reconnaissance and zone reconnaissance. We started with the route reconnaissance, progressed to the zone reconnaissance, and culminated with the screen. Again, each Troop was given an STX lane and accompanying mission to execute. Additionally, during this phase, the Troops also executed other METL training such as assembly area (AA) operations and deep attacks. This phase concluded with Troop EXEVALs.

Phase 4 -- ***Squadron Training.*** During this phase, the Squadrons utilized Squadron STXs and FTXs as the vehicles to hone their skills on Cavalry operations, while also sustaining their skills on their other METL tasks. Staff training was a critical topic during this phase. The Squadrons used MAPEXs, TTP seminars, JANUS and UCATTS to practice their skills. The Squadrons also spent a lot of time with the new draft Mission Training Plan (MTP). At the conclusion of their FTXs, the Squadrons were ready for their EXEVALs.

Phase 5 -- ***The Squadron EXEVAL.*** During this phase, we deployed each Squadron by air, ground and rail to the POLYGON electronic warfare range complex in France. We utilized external evaluators from the other Aviation Brigades in Germany to conduct a four-day evaluation, using the draft MTP as our assessment tool. We also deployed a supporting cast from across the Corps to assist us - UH-60s, MEDEVAC, Signal, MP, COSCOM, Infantry and ATC. Figure 5 provides a graphic illustration of our "Road to War" in execution of this EXEVAL.

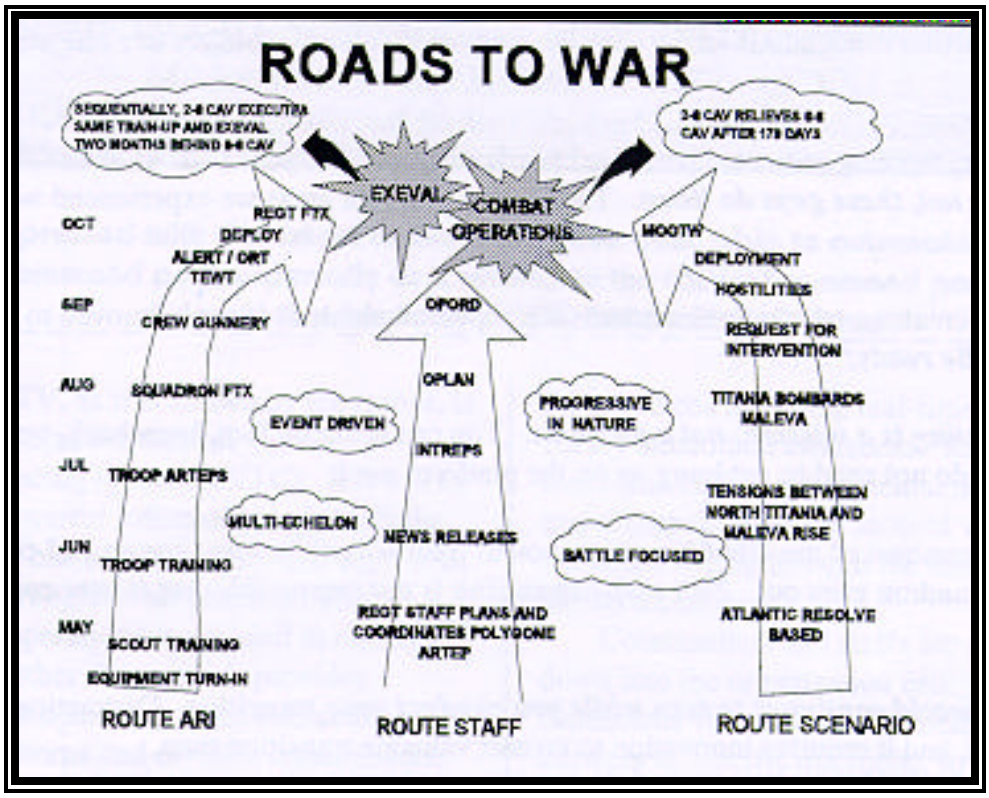

Figure 5: The Road to War

CONCLUSIONS/LESSONS LEARNED

To conclude this article, we have selected ***nine*** overall ***lessons learned*** to highlight.

1. The drawdown of 4-229 AAHR created a tremendous opportunity for the Regiment. **We were able to internally fill many ARI requirements** prior to entering the six-month conversion window. ***Other transitioning units may not have this luxury.***

2. ***Starting early is not a panacea.*** While we were able to fill many personnel and equipment needs before entering the six-month execution cycle, DA and USAREUR support did not come on line until entering the formal six-month cycle. So, while starting early is appealing, be ready to wait for resources you can't fill. As more units enter the ARI transition cycle in the future, competition will become even more scarce for critical personnel and equipment resources.

3. ***It is critical to brief and involve the chain of command.*** They may not know what ARI is, or what help you need to execute it.

4. ***Caring for soldiers is essential.*** The ARI conversion and the loss of jobs related to the OH-58A/C create tremendous anxiety for the soldiers involved. ***Soldiers are our most precious asset!***

5. Begin working projected personnel needs early on with your **G-1/AG/MACOM/DA.** ***Believe it or not, these guys do listen.*** The biggest problem areas we experienced were 68X, 93P and 15L.

6. ARI creates a tremendous amount of equipment which needs to be moved to and from your units. ***Be ready!***

7. ***Scouting is a mission, not a platform.*** You can scout by foot, horseback, vehicle or aircraft. We do not need to get hung up on the platform used.

8. The removal of the UH-60 requires you to "rent a hawk" every time an AH-64 Battalion/Squadron goes out. ***This task-organizing is not impossible, but it sure complicates things!***

9. ***The world continues to turn while you conduct your transition.*** Distractions are many and frequent, and it requires innovation to protect valuable transition time.

In summary, ARI is not mission impossible. We firmly believe that a little sweat and planning up front will pay you significant bonuses down the road. The staff of the 11th Aviation Regiment stands ready to provide any further information or assist you in any way desired as you transition to ARI. ***Good luck!***✪

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RAMP TV -- V CORPS TACTICAL VIDEO TELECONFERENCING: MILESTONE ON THE HIGHWAY TO FORCE XXI

by MAJ George Dodge, Battle Cmd Battle Lab, Fort Leavenworth, KS, DSN 552-8048

I am impressed with the extent to which we have been able to automate the V Corps command post, especially as it relates to the tactical command post.
General Gordon Sullivan, Chief of Staff, U. S. Army

Ramp TV, as it is known by the troops, is V Corps' interactive tactical video teleconferencing system (TVTC). It is one of the most powerful information age tools the commander has to synchronize and fight with his corps throughout all phases of force projection operations in war and in military operations other than war. It provides unprecedented access to, and interaction among, the corps and division commanders, key decisionmakers, and sources of information regardless of physical distance. Built with existing off-the-shelf components, Ramp TV provides a glimpse into the future -- the power of information age technology, its impact on the command of military operations, and the positive influences on force organization, command procedures, and staff systems.

Ramp TV connects elements within and between the corps main command post, corps rear command post, subordinate divisions, and, when needed, the corps tactical command post. Like an interactive video command and O&I net rolled up into one, Ramp TV permits commanders and staffs at each linked location to share a common, relevant picture of the battlefield scaled to their level of interest and tailored to their specific needs. It is used to broadcast battlefield information and information from other sources including real-time friendly and enemy situational awareness. Ramp TV has overcome earlier experimental deficiencies and disappointments in tactical video teleconferencing through the use of state-of-the-art technology.

Commanders and staffs are able to drill down into the organization using the power of continuous video teleconferencing to get answers to specific questions, to pass time sensitive critical information up, down, and across the chain of command, and to maintain the flow of routine, but important, information. All of this gives commanders and staffs at the corps main, corps rear, and the division command posts, both horizontally and vertically, a dynamic, shared perspective of their situations, position, and status in relation to adjacent units as well as a shared perspective of the enemy's disposition, status, and probable intentions. More importantly, it gives the commander a means to set a clear understanding of his intent and guidance in the minds of his subordinates.

The power of Ramp TV derives from three sources: the large number of people it reaches in real time; the reduced cost of information; and the familiarity and availability of the technology. The number of commanders and staff monitoring or using Ramp TV will vary with the rhythm of the corps' operations and scheduled events. During low periods, between 200 and 250 commanders and staff members will have access to the information being passed on the television. Like CNN in garrison, the television is on in the workspace and being monitored. During peak periods, as many as 500 may be watching Ramp TV throughout the corps' area of operations. These peak viewing periods occur as the corps commander is being updated, when critical decisions are being made, or when key information is being passed.

Information-seeking has a cost in terms of inconvenience and in terms of what one would otherwise be able to do if not actively seeking a specific piece of information. Information will be sought until the marginal value of the information equals the marginal cost of seeking the information. Ramp TV reduces the marginal cost of information. Instead of going out of the work area to find a knowledgeable person or making a phone call, a wealth of information is available in broadcast form; one has only to look and listen. Required information that has not been broadcast can be found by picking up the microphone, looking into the camera, and asking a question.

The technology associated with Ramp TV is existing off-the-shelf television equipment we are all familiar with. What is innovative about Ramp TV is how this technology is used to support command and staff processes and functions. Because the technology is familiar to everyone, it is used, and there is a very small learning curve required to become proficient with its use. Most soldiers have spent more time in front of a television set than they have spent operating a computer and are equally comfortable talking into a camera; watching a television monitor; or running a file transfer program..

What is it?

Ramp TV is not video teleconferencing (VTC) as most of us have experienced it, nor is it merely VTC in a tactical setting. Most typical VTCs are distributed meetings limited by time and usefulness that occur across organizational boundaries and geography. Typically they are set up in advance to deal with pre-specified agenda items and are attended by invitation from whomever has called for the VTC. In other words, most VTCs are finite, discrete events of limited usefulness.

Ramp TV, on the other hand, is continuous around the clock, all of the time. The net is installed, and the cameras and televisions are turned on as soon as possible after the corps has deployed. They stay on until the mission is completed and are in constant use by decisionmakers, planners, and other staff. Use of this enabling technology has become as usual and regular as asking a question or having a conversation with a colleague.

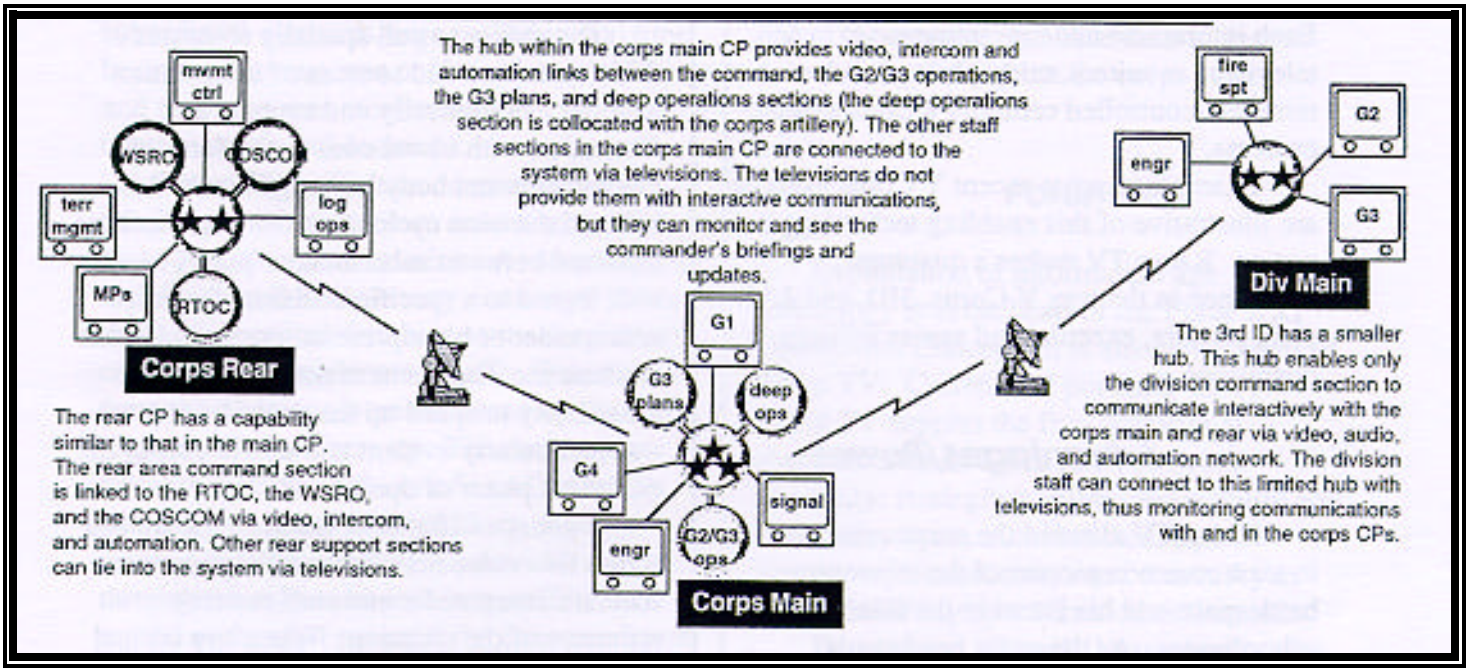

FIGURE 1 - Ramp TV Net Diagram

This CP makes access to information so quick and easy,
***it truly enhances my ability to command the corps.*"**
LTG Jerry Rutherford, Commander, V Corps

Within the corps main command post, the commander, his chief of staff, G3, and battle captain are interactively linked via coaxial or fiber-optic cable with the current operations cell, the plans cell, and the deep attack cell. This gives each the capability to receive and transmit video and audio. Receive-only televisions are set up throughout the various vans and shelters that compose the corps main so that everyone working in the main has access to the information passed over Ramp TV. Each interactive node in the main has the ability to transmit and receive full motion video and sound to any other node within the main, to the rear command post, and subordinate divisions using MSE, tactical satellite, or commercial communications systems.

The deputy commanding general at the rear command post has an interactive link via coaxial or fiber-optic cable to the corps support command, the whole system resupply operations (WSRO), and rear operations. There are receive-only televisions located throughout the various cells at the rear. Each division main command post has an interactive node used by the commander, G3, battle captain, and others. Divisional interactive video nodes are linked with the corps main and the corps rear command posts. Receive-only televisions are located throughout division main command posts.

Computers are hooked into this network to provide the ability to display computer-generated graphics and to transfer data files. Each interactive node is composed of television monitors, microphones, and remotely controlled centrally located video cameras.

Examples from a recent V Corps exercise are illustrative of this enabling technology's power. Ramp TV makes a quantum difference in the way V Corps, 3ID, and 1AD plan, prepare, execute, and assess military operations.

Advantages/Power

Ramp TV allowed the corps commander to set a common picture of the relevant battlespace and his intent in the minds of his subordinates. As the corps commander received periodic situation and status briefings, he would occasionally stop the briefer to clarify a point, provide guidance or emphasize a point. When the friendly situation was briefed, it was done from each division's headquarters by either the division commander or his battle captain using the division's own situation map. Other status briefings were done by briefers located in their duty sections whether they be at corps main, division, or rear. These briefings and updates for the corps commander along with his resulting comments and guidance were seen by over 500 commanders and staff throughout the corps and divisions as they occurred. That is over 500 decisionmakers, planners, and executors who got the word firsthand from the most accurate source no matter where that source was located in the corps. When the corps commander had a question during these sessions, someone within the corps on the video network either had the answer or immediately began the search for the answer.

The ability to pull spatially separated decisionmakers and sources of information together electronically and support the discussion with visual cues in the form of graphic aids and body language resulted in reduced decision cycle times. When conflicts occurred between subordinates' points of view with regard to a specific decision, the corps commander or his representative would either arbitrate the conflict or make the decision. This ability to speed up the decision process was particularly evident and useful during the execution phase of operations.

A constant stream of information flowed across this video network resulting in more accurate commander and staff running estimates of the situation. When any critical event occurred or was anticipated it was discussed on Ramp TV in real time. Status of critical items like ATACMS rounds was passed as were battle-damage assessments and friendly losses. Some existing routine paper reports became merely confirmation of what was already known. When the network was not broadcasting discussions or verbal information, cameras defaulted to situation maps at corps operations and each division so that all one had to do is glance at the split TV screen to see the most current situation being reported at each location.

This constant flow of information, that ability to ask and answer questions, and the ability to give specific guidance facilitated the integration and focus of decisionmakers and planners both horizontally and vertically. A discussion between the corps G3 and the division G3 may have implications and actions for the rear. A decision made between the deep battle cell and corps commander may have implications and actions for a division. The implications and actions for adjacent or subordinate elements were passed in real time because everyone was on the video network and everyone was monitoring the conversations and decisions.

Ramp TV's effect on concurrent and parallel planning was seen soon after receipt of a corps change of mission. As soon as they had developed likely enemy courses of action, corps planners briefed them to the deep attack cell and division planning staffs. Questions from the divisions were answered by the corps planners as they came up. The entire video network monitored the briefing. End result was a more clear picture of likely enemy courses of action that was understood throughout corps and divisions staffs. This served as the start point for the concurrent and parallel planning that followed and subsequent coordination using Ramp TV as plans were finalized.

During this exercise, the corps commander fought his corps from the main CP because the information available from that location was as good or better than the information available from the TAC. When the commander went forward, point-to-point voice back to the main gave him access to current information within the corps. Had the commander decided to stay forward, he had an interactive node capability built into his TAC that would allow him access to the video network. The implication is that while the corps commander doesn't have access to real-time broadcast information wherever he may be on or above the battlefield, the interactive video node at the corps main is a single point he can access while on the move or forward to receive the most current and complete information in the corps. Dispersal of the interactive nodes on the battlefield also gives the corps commander the ability to go to any one of these nodes and have face-to-face connectivity throughout the corps video network.

Potential

Exploitation of information age technology is at the heart of the Force XXI Operational Concept. It is also at the heart of Ramp TV. Current and potential uses of Ramp TV support the five operational characteristics of Force XXI: doctrinal flexibility; strategic mobility; tailorability and modularity; joint, multinational, and interagency connectivity; and versatility in war and military operations other than war.

Doctrinal Flexibility. Application of Ramp TV has forced V Corps to rethink command and control, how it organizes, and the procedures and processes required to plan, prepare, and execute military operations. The changes are necessary to maximize the technology's impact on the corps' ability to move and share timely information. Existing doctrine has not been adequate in all cases and will have to evolve. For example, what are the implications for the deliberate decisionmaking process when commanders and staffs both vertically and horizontally have real-time access to the same information, decisions, and guidance?

Strategic mobility. Ramp TV can potentially provide a corps assault command post with nearly the same functionality as the entire corps staff for short periods of time. Through the video network, the forward deployed interactive command node (four or five vehicles and 20 or 30 soldiers) can be operational while the rest of the corps staff supports from home station or other sanctuary locations. This has potential implications for effective and seamless command and staff extension in force projection operations, during early entry assault , during MOOTW, and for situations where the corps serves as a land JTF command.

Tailorability and modularity. Ramp TV facilitates the flow of information of task-organized elements who are separated by geography through any of the phases of force-projection operations. Inclusion of an interactive video node with a force tailored for a specific mission will give that force the benefit and support of corps command and control

Joint, multinational, and interagency connectivity, interactive video links established with joint, multinational, or other agencies can easily be integrated into the corps video network. Such links and the resulting real-time face-to-face interaction would be instrumental in working through interpersonnel communications problems, assuring a common understanding of expectations and intentions, and for seeking advice and guidance. Joint, multinational, or agency decisionmakers and subject-matter experts not normally a part of the process and separated by geography would be able to "sit at the table" as information was exchanged or decisions were made.

Versatility in War and OOTW. Benefits that accrue from the use of Ramp TV in war also apply to military operations other than war. Considering the extended command and control Ramp TV provides, military presence could be reduced to the minimum essential required for a given MOOTW operation and the real-time command and control exercised by the higher nondeployed headquarters could be as lose or tight as the political or humanitarian situation required.

Final Thoughts/Concerns

Information and decisions move very quickly throughout the corps with the use of Ramp TV. Information and guidance must be turned into plans and taskings. This takes time. At some point, orders have to be issued to those not connected to the video network.

Maximizing the power of TVTC will require some thought on the procedures and discipline that must be practiced. Just as radio telephone procedures, formats, and instructions have evolved, TVTC procedures, formats, and instructions must evolve. TVTC's impact on command and staff processes, functions, and organization has not been fully explored.✪

The VTC has spoiled me. This CP is tearing down the walls between my staff sections. ***I wouldn't want to command a corps without it.*** **"**
GEN (R) David Maddox, former CINC, USAREUR

VEHICLE MINE SURVIVABILITY

by William C. Schneck, Countermine Systems Directorate, Ft Belvoir, VA

Vehicular mine incidents were one of the primary causes of U. S. casualities in Somalia, accounting for 26 percent of the Americans killed in action during Operation RESTORE HOPE. Several countries have countered route mining by developing mine-resistant vehicles that reduce mine casualties by as much as 60 to 70 percent while almost eliminating fatalities.

In Somalia and other countries, mines have become one of the weapons of choice in Operations Other than War (OOTW). The primary mine threat to tactical vehicles is from large blast mines (12 pounds or more high explosive) and directional fragmenting antipersonnel (AP) mines, although some advanced mines may also be encountered. In three mine incidents involving HMMWVs, 92 percent of all occupants were casualties (including 50-percent fatalities). Convoys of wheeled vehicles operating along insecure lines of communications with limited firepower and manpower are particularly vulnerable to mines and ambushes. The deployment of mechanized and armored units to Mogadishu did not solve the vulnerability problem of U. S. logistics personnel.

Since World War II, American efforts to counter the mine threat have largely focused on the detection and breaching of tactical minefields. Emphasis has not been placed on tactical vehicle crew survivability against mines. The rate of U. S. vehicular losses due to mines has been rising since World War II.

U.S. Vehicular Loss Rates
World War II 23%
Korea 56%
Vietnam 70%

As in the past, U. S. personnel in Somalia were forced to resort to expedient methods of vehicular mine protection, such as sandbagging and reinforcement with steel plates. If not done properly, improvised efforts may increase the chance of crew casualties. Many of the cargo trucks checked in Mogadishu had 4 to 5 tons of sandbags placed on the vehicle. Some HMMWVs were overloaded to the point that there was serious deterioration in some of the suspension system components. The HMMWV retrofit kit developed for Somalia had wheel well deflectors and floor armor as well as protection from small arms fire. However, even with the retrofit kit, a HMMWV with its flat bottom, low weight, low ground clearance and aluminum body remains extremely vulnerable in the event of an antitank mine detonation. The M923A2, 5-Ton Cargo Truck Mine and Direct Fire Protection Kit developed for Somalia included wheel and centerline blast deflectors, floor armor, protection against small arms fire (windshield, door and armored bucket seats) and shock-absorbing seat cushions to protect personnel in the cab from high accelerations. The kit provided protection approaching that of some of the special purpose vehicles developed in South Africa. Nonetheless, there are limitations on what can be accomplished with a retrofit kit that is installed in the field.

It appears that wheeled vehicles have more potential for mine survivability than tracked vehicles. The air in the tires and the comparatively weak attachment of the wheel to the axle serve to isolate the vehicle from the worst blast effects by minimizing the amount of energy transferred to the vehicle. This effect, combined with a "v"-shaped hull designed with sufficient standoff and ductile armor, makes it possible to produce wheeled vehicles that can withstand the effects of a mine blast with minimal damage and crew casualties. However, vehicle design must address a number of variables to successfully protect the crew.

The immediate thrust of any further U. S. efforts to develop mine-resistant vehicle technology should be to protect the crew. The vehicle should be considered expendable in the event of a mine blast. However, the survivability of personnel in a vehicle that has suffered a mobility kill from a mine in an area that is covered by direct fire weapons is not good. Therefore, for the long term, it is highly desirable to field a mine-protected vehicle that will be able to withstand a mine detonation with enough mobility remaining to enable it to move to cover, or out of the kill zone. Until more advanced systems are developed, extreme caution should be exercised when HMMWVs are used along an unsecured MSR or through other unsecured areas.

For additional information and a list of references for this article refer to ***Operation RESTORE HOPE AAR,*** 13 Jun 94, by William C. Schneck, Belvoir Research, Development and Engineering Center, Fort Belvoir, VA, (DSN 654-2446 or Coml (703) 704-2446).

For current doctrine, see Chapter 10, ***Mine-Countermine Operations,*** **FM 20-32,** 30 Sep 92 (with Change 1, 17 Aug 1994).

Collective (unit) skills are found in ***Mission Training Plan for the Combat Engineer Platoon (Airborne, Air Assault, Motorized Division and Airborne Corps,*** **ARTEP 5-025-11-MTP,** Oct 89, pages 5-104 to 5-107.✪

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